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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/483,569	01/14/2000	Stehpen S. Oh	TI-23373	8551

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EXAMINER	
OPSASNICK, MICHAEL N	

ART UNIT	PAPER NUMBER
2655	

DATE MAILED: 02/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/483,569	OH ET AL.	
	Examiner	Art Unit	
	Michael N. Opsasnick	2655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 9-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 9-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Upon further search of the prior art, relevant prior art has been published after the date of the final office action (dated 2/7/05); therefore, the finality of the office action dated 2/7/05 is removed, and prosecution on the merits of this application is reopened.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3,9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bloebaum et al (6070137) in view of Oppenheim (Discrete Time Signal Processing, pp 57,59,60,542-543,548)..

As per claims 1 and 9, Bloebaum et al (6070137) teaches:

Receiving a stream of sampled acoustic signals and digitizing each sampled acoustic signal thereby forming digital samples (sampler, Fig. 3, element 26),

selecting a fixed number of digital samples by multiplying the digital samples by a windowing function (signals converted into frames, col. 4, lines 24-25),

computing the Fast-Fourier-Transform of the selected windowed digital samples to yield transformed windowed signals (DFT, Figure 3, element 42 with col. 5, lines 10-1 1),

selecting half the Fourier-transformed windowed signal data (single-sided, frequency-domain representation because of the complex-conjugate symmetry of a Fast Fourier Transform of real signals, col. 5, lines 8-10),

calculating a power estimate (power spectral density, col. 5, lines 17-19),

calculating a smoothed power estimate over time by smoothing the power estimate using the recited (i.e., first-order AR smoothing) equation (Fig. 5, element 64 with "smoothed version of S" in col. 8, lines 6-8, cf. first-order AR smoothing, col. 5, lines 38-44), wherein noting that S is signal power with signal present and noise power when signal is absent. thus also calculating a noise estimate,

calculates a gain function from the signal and noise power estimates (enhancement filter, col. 6, lines 8-10), and

calculating a transformed signal by multiplying the gain function with the transformed windowed signal (col. 6, line 35-41).

Bloebaum et al are interested in speech (voice) coding rather than speech decoding, and thus do not explicitly teach calculating an (enhanced) speech signal! By calculating an inverse FFT on the transformed window signal to yield a sampled speech signal. However this is suggested by them, since the examiner takes Official Notice that an artisan at the time of invention would have known, from her required digital signal analysis course, to obtain back a time domain version thereof, consisting of a sampled speech signal, for playback to the listener.

As per claims 1,9, Bloebaum et al (6070137) teaches the smoothing function in the frequency domain (col. 5 lines 60-65). Bloebaum et al (6070137) also teaches using a linear or circular convolution to perform this smoothing function (col. 6 line 1-6). Examiner notes that Bloebaum et al (6070137) does not expand upon the time domain equivalent of this calculation, however, Oppenheim (Discrete Time Signal Processing, pp 57,59,60,542-543,548) explicitly teaches that a convolution in the frequency domain (page 60, equation 2.151) is a multiplication in the time domain (page 60, equation 2.150). Therefore, it would have been obvious to one of ordinary skill in the art of signal processing to recognize that the convolution based smoothing function as taught by Bloebaum et al (6070137) has a time based smoothing equivalent because of the duality nature of the Fourier transform and that the convolution of Fourier transforms are equivalent to the multiplication of the sequences (Oppenheim (Discrete Time Signal Processing, pp 57,59,60,542-543,548), page 60, first textual paragraph).

As per claims 2 and 10, the combination of Bloebaum et al (6070137)in view of Oppenheim (Discrete Time Signal Processing, pp 57,59,60,542-543,548) does not teach a frame size of 32 samples. However, the examiner takes Official Notice that it was well known at the time of invention to use a "power of two" sample size for FFT processing and that standard speech frame sizes are 2.5, 5, 10, and 20 milliseconds, and that 32 samples would correspond to somewhere between 5 and 2.5 milliseconds of speech data at the standard sampling rates. It would have been obvious for one of ordinary skill at the time of invention to use such standard speech frame sizes so as to enable her to use conveniently-available standard signal processing hardware and software.

As per claims 3 and 11, the combination of Bloebaum et al (6070137)in view of Oppenheim (Discrete Time Signal Processing, pp 57,59,60,542-543,548) does not say what inherent window they are using. However, the examiner takes Official Notice that at the time of invention it was notoriously well-known to use a Hanning (raised cosine) window. It would have been obvious for one of ordinary skill at the time of invention to use a Hanning window, because of its enables one to do easy "unwindowing" by the addition after inverse FFT, when using 50 percent time frame overlap.

Response to Arguments

4. Applicant's arguments filed 9/27/2005 have been fully considered but they are not persuasive. As per applicant's arguments that Bloebaum et al fails to teach smoothing over time (page 5,6,9), examiner directs applicant's attention to the revised explanation of the Bloebaum smoothing function, as noted above. As per applicant's arguments on pages 8 and 10 of the response toward the power estimates, examiner notes that Bloebaum does indeed teach the smoothing (col. 5 lines 60-64 – for a power spectrum estimate), as well as a power spectral density estimate (col. 5 lines 40-48). The claimed power estimate of claim 1 pertains to a power estimate of the signals, wherein such signals can include non-speech.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Gao et al (6862567) teaches a time based noise suppression system (fig. 2, abstract)

Saunders et al (6898290) teaches noise attenuation with a feedback and feedforward gain control (fig. 4, and fig. 6)

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Opsasnick, telephone number (571)272-7623, who is available Tuesday-Thursday, 9am-4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Richemond Dorvil, can be reached at (571)272-7602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

2/15/06
mno

RICHEMOND DORVIL
SUPERVISORY PATENT EXAMINER